

REMARKS

Claims 1-23 are pending in the application. Claims 1 and 15 have been amended, and claims 2-3, 10-14, and 19-23 have been withdrawn pursuant to a restriction requirement. No new matter has been introduced by the amendment.

Rejection Under 35 U.S.C. §103(a)

Claims 1 and 15-18 have been rejected over Moon et al. This rejection is overcome in view of the amendment of claim 1 together with following remarks.

Claim 1, as amended, recites an optical arrangement that includes two parallel plates. Each parallel plate includes a through-hole, and the through-holes define an optical input/output. The optical arrangement further includes first fastening studs on the first plate and on the second plate that are connected by first bumps. The first fastening studs are positioned transversely opposite on the first plate and on the at least partly optical component. The first bumps are configured so as to align the optical component to the optical input/output on the first plate. The optical arrangement also includes second fastening studs positioned on the two parallel plates and connected by second bumps. The second fastening studs are distinct from the first fastening studs and are configured to optically align the optical input/outputs in each of the two parallel plates.

The Office Action asserts that Moon et al. disclose two parallel plates (100 and 200) and that the first fastening studs (204a) are placed transversely opposite the first plate (100) and connected by first bumps (208). The plate (100) is the substrate of an optical component (C). Thus, the optical device (C) is analogized to be a “plate” as recited in claim 1. The Office Action further asserts that Moon et al. disclose second fastening studs placed transversely opposite the two plates and connected by second bumps (102 and 110a).

The reliance on Moon et al. as rendering the applicant’s claims obvious is misplaced. The applicant asserts that the Office Action misreads the disclosure of Moon et al. Element (100) of, Moon et al. is the substrate of an optical device (C) (see para. 0025) and not a “plate” as recited in claim 1. The applicant’s claim 1 recites an optical arrangement comprising two parallel plates and an optical device. The optical device and the plates are not the same structure either in applicant’s device or the device disclosed by

Moon et al. The optical device and the two parallel plates are separate structures with completely different functions. Further, in the Moon et al. device, both the bumps, or solder balls, (208) and the bumps (110a) contact the same under ball pattern (204a). Accordingly, the device of Moon et al. does not have distinct first and second fastening studs, as recited in claim 1.

The Office Action recognizes that the substrate (100) of Moon et al. does not include a through-hole, nevertheless the Office Action asserts that one skilled in the art would recognize that a through-hole could be placed in the substrate (100). (Office Action, pg. 3). The applicant asserts that one skilled in the art would not place a through-hole through an active substrate of the optical component. This could potentially compromise the function of the optical component. Further, Moon et al. do not even suggest that a through-hole be formed in their optical component (C). Rather, Moon et al. disclose forming an optical sub-module by flip-chip bonding the optical component (C) to a silicon wafer (200). (See paras. 0029-0032 and paras. 0046-0048). The silicon wafer (200) is processed by cutting through-holes (202) in the wafer and aligning under ball metal patterns (204a) to the through-holes (202). (See paras. 0041-0043). After attaching the optical component to the silicon wafer, Moon et al. install an optical fibre in the through-hole without operating the optical device. (see para. 0032). Moon et al. refer to this step as passive alignment. *Id.*

The failure of the Office Action to specifically identify an element of Moon et al. corresponding to the claimed second fastening studs is telling. The applicant's claimed second fastening studs are distinct from the first fastening studs and are configured to optically align the optical input/outputs in each of the two parallel plates. Moon et al. only disclose the attachment of the optical component (C) to the silicon wafer (200) and do not disclose any type of subsequent alignment of two parallel plates. Instead, Moon et al. disclose sub-modules that have one plate and one component thereon, there is no teaching or suggestion of a second plate or the second fastening studs, as recited in claim 1. As pointed out above, the solder balls (208) of Moon et al. are connected to the same under ball metal patterns (204a) as the bumps (110a). The solder balls (208) are simply described as providing transmission of electrical signals to the outside of the optical

device chip (C). (See, para. 0026). Accordingly, Moon et al. does not render claim 1 obvious and this rejection should be withdrawn.

Claims 15-18 each define further aspects of claim 1 from which they depend. These claims are allowable in view of the amendment and foregoing remarks pertaining to claim 1.

Claim 15 has been amended to correct an inadvertent typographical error and to maintain proper antecedent basis with claim 1.

Claims 4-9 have been rejected over Moon et al, in view of Mok et al. This rejection is overcome in view of the amendment of claim 1 together with the following remarks.

The Office Action asserts that Mok et al. disclose flip chip bonding to align optical elements using desirable metals including nickel, gold or copper alloys, and, as such, claims 4-9 are obvious when combined with Moon et al. (Office Action, pg. 3). The applicants assert that the addition of Mok et al. does not overcome the deficiencies of Moon et al. Despite the disclosure of various metals and metal alloys for use in contact bumps, Mok et al. fail to suggest or disclose the optical arrangement recited in claim 1. The applicant's foregoing remarks pertaining to claim 1 are incorporated herein.

The Applicant has made a novel and non-obvious contribution to the art of optical device design. The claims at issue distinguish over the recited references and are in condition for allowance. Accordingly, such allowance is now earnestly requested. The Examiner is invited to contact the undersigned attorney for the Applicant via telephone if such communication would expedite this application.

Respectfully submitted,

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